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Application Number 08/322 348

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US006352828B1

(12) **United States Patent**  
**Brenner**

(10) **Patent No.:** **US 6,352,828 B1**  
(45) **Date of Patent:** **Mar. 5, 2002**

(54) **OLIGONUCLEOTIDE TAGS FOR SORTING AND IDENTIFICATION**

WO 97/31256 8/1997

(75) **Inventor:** **Sydney Brenner**, Cambridge (GB)

(73) **Assignee:** **Lynx Therapeutics, Inc.**, Hayward, CA (US)

(\*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **09/053,116**

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#### **Related U.S. Application Data**

(60) Division of application No. 08/659,453, filed on Jun. 6, 1996, now Pat. No. 5,846,719, which is a continuation-in-part of application No. 08/358,810, filed on Dec. 19, 1994, now Pat. No. 5,604,097, which is a continuation-in-part of application No. 08/322,348, filed on Oct. 13, 1994, now abandoned.

(51) **Int. Cl.<sup>7</sup>** ..... **C12Q 1/68; C12P 19/34; C12N 15/11; C07H 21/04**

(52) **U.S. Cl.** ..... **435/6; 435/91.1; 536/23.1; 536/24.3; 536/24.33; 536/25.3; 536/25.32; 536/25.4**

(58) **Field of Search** ..... **435/6, 91.1; 536/23.1, 536/24.3, 24.33, 25.3, 25.32, 25.4**

(56) **References Cited**

#### **U.S. PATENT DOCUMENTS**

|             |         |                |           |
|-------------|---------|----------------|-----------|
| 4,942,124 A | 7/1990  | Church         | 435/6     |
| 5,149,625 A | 9/1992  | Church         | 435/6     |
| 5,302,509 A | 4/1994  | Cheeseman      | 435/6     |
| 5,482,836 A | 1/1996  | Cantor et al.  | 435/6     |
| 5,514,543 A | 5/1996  | Grossman       | 435/6     |
| 5,552,278 A | 9/1996  | Brenner        | 435/6     |
| 5,599,675 A | 2/1997  | Brenner        | 435/6     |
| 5,604,097 A | 2/1997  | Brenner        | 435/6     |
| 5,635,400 A | 6/1997  | Brenner        | 435/320.1 |
| 5,654,413 A | 8/1997  | Brenner        | 536/22.1  |
| 5,658,736 A | 8/1997  | Wong           | 435/6     |
| 5,695,934 A | 12/1997 | Brenner        | 435/6     |
| 5,846,719 A | 12/1998 | Brenner et al. | 435/6     |
| 5,863,722 A | 1/1999  | Brenner        | 435/6     |

#### **FOREIGN PATENT DOCUMENTS**

|    |           |         |
|----|-----------|---------|
| CA | 2036946   | 10/1991 |
| EP | 303459 A3 | 2/1989  |
| EP | 392546 A2 | 10/1990 |
| WO | 90/03382  | 4/1990  |
| WO | 92/00091  | 1/1992  |
| WO | 92/10587  | 6/1992  |
| WO | 92/10588  | 6/1992  |
| WO | 93/06121  | 4/1993  |
| WO | 93/17126  | 9/1993  |
| WO | 93/21203  | 10/1993 |
| WO | 93/22680  | 11/1993 |
| WO | 93/22684  | 11/1993 |
| WO | 94/08051  | 4/1994  |
| WO | 95/20053  | 7/1995  |
| WO | 96/12014  | 4/1996  |
| WO | 96/12039  | 4/1996  |

#### **OTHER PUBLICATIONS**

Search Report from International Patent Application PCT/US95/12791 (published as WO 96/12014).

Search Report from International Patent Application PCT/US96/09513 (published as WO 96/41011).

Aslandis, et al., "Ligation-independent Cloning of PCR Products (LIC-PCR)," *Nucleic Acids Research* 18:6069-6074 (1990).

Beck, et al., "A Strategy for the Amplification, Purification, and Selection of M13 Templates for Large-Scale DNA Sequencing," *Analytical Biochem.* 212:498-505 (1993).

Brenner, et al., "Encoded Combinatorial Chemistry," *Proc. Natl. Acad. Sci. U.S.A.* 89:5381-5383 (1992).

Broude, et al., "Enhanced DNA Sequencing by Hybridization," *Proc. Natl. Acad. Sci.* 91:3072-3076 (1994).

Brown, et al., "A New Base-Stable Linker for Solid-Phase Oligonucleotide Synthesis," *J. Chem. Soc. Commun.* 891-893 (1989).

Chetverlin, et al., "Oligonucleotide Arrays: New Concepts and Possibilities," *Biotechnology* 12:1093-1099 (1994).

Church, et al., "Multiplex DNA Sequencing," *Science* 240:185-188 (1988).

Coche, et al., "Reducing Bias in cDNA Sequence Representation by Molecular Selection," *Nucleic Acids Research* 22:4545-4546 (1994).

Crick, et al., "Codes without Commas," *Proc. Natl. Acad. Sci.* 43:416-421 (1957).

(List continued on next page.)

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(57) **ABSTRACT**

The invention provides a method of tracking, identifying, and/or sorting classes or subpopulations of molecules by the use of oligonucleotide tags. Oligonucleotide tags of the invention comprise oligonucleotides selected from a minimally cross-hybridizing set. Preferably, such oligonucleotides each consist of a plurality of subunits 3 to 9 nucleotides in length. A subunit of a minimally cross-hybridizing set forms a duplex or triplex having two or more mismatches with the complement of any other subunit of the same set. The number of oligonucleotide tags available in a particular embodiment depends on the number of subunits per tag and on the length of the subunit. An important aspect of the invention is the use of the oligonucleotide tags for sorting polynucleotides by specifically hybridizing tags attached to the polynucleotides to their complements on solid phase supports. This embodiment provides a readily automated system for manipulating and sorting polynucleotides, particularly useful in large-scale parallel operations, such as large-scale DNA sequencing, mRNA fingerprinting, and the like, wherein many target polynucleotides or many segments of a single target polynucleotide are sequenced simultaneously.

**16 Claims, 3 Drawing Sheets**